

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)



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Applicant's or agent's file reference P 03 017WO		FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/DK 03/00257	International filing date (day/month/year) 15.04.2003	Priority date (day/month/year) 15.04.2003	
International Patent Classification (IPC) or both national classification and IPC F03D1/00			
Applicant VESTAS WIND SYSTEMS A/S et al.			

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
 - ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 6 sheets.

3. This report contains indications relating to the following items:
 - I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the International application

Date of submission of the demand 24.09.2004	Date of completion of this report 21.07.2005
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Avramidis, P Telephone No. +49 89 2399-7317 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/DK 03/00257**

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*):

Description, Pages

1-33 as originally filed

Claims, Numbers

1-33 filed with telefax on 24.06.2005

Drawings, Sheets

1/13-13/13 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY
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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-33
	No: Claims	
Inventive step (IS)	Yes: Claims	1-33
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-33
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

The present invention relates to a method of servicing the outer components of a wind turbine.

Such methods are known from, for example DE 197 26 408 C1 (D1). Therein a wind turbine blade enters into an opening of the work platform which slides on two wires that are connected and tightened to the ground and to the nacelle or the upper part of the tower of the wind turbine. The work platform is further connected to a third wire which is attached to the nacelle and allows the work platform to move up or down along the blade while sliding on the wires.

With the features of claim 1, in particular by holding the work platform to the side of the wind turbine tower by directly gripping the tower with holding means comprised in the work platform, the invention provides a less cost and time consuming method for servicing the outer components of a wind turbine, which allows safe and stable working conditions for the workers even under unstable conditions like gust of wind. Thereby it is not necessary to fix and tighten the wires to the ground since the stability is provided by the holding means comprised in the work platform.

None of the prior art documents which have become known to this Authority discloses all features of independent claim 1. Furthermore, claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) since its features are not taught or suggested by the prior art documents.

Claims 2-9 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

Independent claim 10 is directed to a corresponding work platform for servicing the outer components of a wind turbine which is based on the inventive idea of claim 1, i.e. said platform comprises gripping means for directly holding the same to the tower. Claims 11-33 are dependent on claim 10 and as such they also meet the requirements of the PCT with respect to novelty and inventive step.

Therefore, the present application meet the requirements of Article 33(2) and (3) PCT, because the subject-matter of claims 1-33 is new and involves an inventive step.

Certain defects in the international application

1. Independent claim 1 is not in the two-part form in accordance with Rule 6.3(b) PCT, with those features known in combination from the prior art (document D1) being placed in the preamble (Rule 6.3(b)(I) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).
2. The features of claims 1-9 are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
3. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1 is not mentioned in the description, nor is this document identified therein.

Claims

1. Method of servicing the outer components of a wind turbine such as the wind turbine blades and the tower with a work platform, said method comprises the steps of:
- 5 positioning the work platform at the wind turbine tower,
- connecting the work platform to an upper part of the wind turbine with at least one cable,
- 10 raising the work platform with the cable and cable winding means to a position of use, and
- 15 holding the work platform to the side of the wind turbine tower by directly gripping the tower with holding means comprised in the work platform.
2. Method according to claim 1, wherein said holding is established with at least two sets of suction or vacuum cups.
- 20 3. Method according to claim 1, wherein said holding is established with at least two sets of electromagnetic means.
4. Method according to claim 1, wherein said holding is established with retaining means surrounding said wind turbine tower.
- 25 5. Method according to claim 2 or 3, wherein said holding is enhanced by positioning said suction or vacuum cups or electro magnetic means on the ends of holding arms, said arms gripping around the exterior of the wind turbine tower.
- 30

6. Method according to any of the claims 1 to 5, wherein said method further comprises the step of moving the work platform horizontally by extracting or retracting horizontal forcing means of the work platform.
- 5 7. Method according to claim 6, wherein the extracting or retracting is established telescopically by a number of arm sections in said horizontal forcing means.
8. Method according to any of the claims 1 to 7, wherein cable guiding means
10 angles the cable outwards in relation to the wind turbine tower from the starting point of the cable.
9. Method according to any of the claims 1 to 8, wherein said work platform is moved up or down by following and rolling with steering wheels of the platform on the surface of the wind turbine tower.
- 15 10. Work platform (6) for servicing the outer components of a wind turbine such as the wind turbine blades (5) and the wind turbine tower (2), said platform comprising
- 20 at least one cable (7, 7a, 7b, 7c) connecting the work platform with an upper part of the wind turbine,
- cable winding means (43, 44) winding said at least one cable,
- 25 c h a r a c t e r i s e d i n t h a t
- said platform further comprises gripping means (8) for directly holding the work platform (6) to the tower (2).

11. Work platform according to claim 10, characterised in that said at least one cable (7) comprises a number of outer cables (7a, 7b), said set including a main cable (7a) and one or more additional cables (7b).
- 5 12. Work platform according to claim 10 or 11, characterised in that said at least one cable (7) further comprises an inner cable or cables (7c).
- 10 13. Work platform according to claim 11 or 12, characterised in that said inner and outer cables (7a, 7b, 7c) are fixed to the underside of the wind turbine nacelle (3) at an inner and outer anchorage point (45) in direction from the tower or to anchorage points inside the nacelle.
- 15 14. Work platform according to any of the claims 10 to 13, characterised in that said gripping means (8) comprises at least two sets of suction or vacuum cups (15a, 15b).
- 20 15. Work platform according to any of the claims 10 to 13, characterised in that said gripping means (8) comprises at least two sets of electromagnetic means.
- 25 16. Work platform according to any of the claims 10 to 13, characterised in that said gripping means (8) comprises retaining means surrounding the wind turbine tower such as at least one retaining belt.
- 30 17. Work platform according to claim 14 or 15, characterised in that each of said at least two sets of suction or vacuum cups (15a, 15b) or electromagnetic means are flexibly mounted to the end of a holding arm (19a, 20a, 21a; 19b, 20b, 21b respectively).

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18. Work platform according to claim 17, characterised in that said holding arm includes a base arm section (21a, 21b), inner arm section (20a, 20b) and outer arm section (19a, 19b).
- 5 19. Work platform according to claim 18, characterised in that said inner arm section (20a, 20b) and outer arm section (19a, 19b) are pivotally connected and controlled by arm actuating means (22a, 22b) in at least one direction.
- 10 20. Work platform according to any of the claims 10 to 19, characterised in that said gripping means (8) comprises one or more steering wheels (14, 14a, 14b).
- 15 21. Work platform according to any of the claims 10 to 20, characterised in that guard rails (13) and a foundation (18) define a work area of said platform.
- 20 22. Work platform according to any of the claims 10 to 21, characterised in that said gripping means (8) and the foundation (18) are connected through horizontal forcing means (23).
- 25 23. Work platform according to any of the claims 10 to 22, characterised in that said horizontal forcing means (23) includes a number of horizontal forcing arms (23a, 23b).
24. Work platform according to any of the claims 10 to 23, characterised in that said horizontal forcing arms (23a, 23b) are integrated into each other as part of telescopic forcing means.
- 30 25. Work platform according to any of the claims 10 to 24, characterised in that the side or sides of said platform

includes one or more indentations (11, 11a, 11b) for receiving and docking one or more wind turbine blades (5).

26. Work platform according to any of the claims 10 to 25,
5 characterised in that said platform includes retaining means (16a, 17a; 16b, 17b) for retaining the wind turbine blade (5) in one of said indentations (11, 11a, 11b).

27. Work platform according to claim 26, characterised in that
10 said retaining means (16a, 17a; 16b, 17b) includes one or more suction or vacuum cups (16a, 16b) positioned on one or more rods as base part (17a, 17b) for the retaining means.

28. Work platform according to any of the claims 10 to 27,
15 characterised in that said at least one cable (7, 7a, 7b, 7c) is controlled by cable guiding means (12) e.g. by one or more cable guidance wheels in said means.

29. Work platform according to any of the claims 10 to 28,
20 characterised in that the position of said cable guiding means (12) controls the angling of the at least one cable (7, 7a, 7b, 7c).

30. Work platform according to any of the claims 10 to 29,
25 characterised in that said cable guiding means (12) angles the cable outwards in relation to the wind turbine tower from the anchorage point of the cable e.g. in the event in which the horizontal forcing means is fully retracted.

31. Work platform according to any of the claims 10 to 30,
30 characterised in that said platform includes control means (40), said means at least controls said arm actuating means (22a, 22b), horizontal

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forcing means (23), said one or more suction or vacuum pumps (39) and/or said cable winding means (43, 44).

32. Work platform according to claim 31, characterised in that
5 said control means (40) is connected wired or wirelessly to and controlled by at least one remote control (42).

33. Work platform according to claim 31 or 32, characterised in
10 that said control means (40) and auxiliary devices are controlled with more than one remote control, said controls work in a master and slave configuration.